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ABSTRACT

This paper presents a complex, hybrid, method of cost analysis of online courses, which incorporates data on expenditures; student/course enrollment; departmental consumption/contribution; space utilization/opportunity costs; direct non-personnel costs; computing support; faculty/staff workload; administrative overhead at the department, dean, and institution level; revenue stream; and financial aid. Data compared costs of online versus traditional courses at an urban, public, doctoral I university for four pairs of courses: English, management information systems, decision sciences, and astronomy. Among the findings noted are the following: total expenditures for traditional and online courses are in relatively the same range (with one exception which had high overhead but also high revenues); net costs per section are higher for online courses; departments which have extensive course sections benefit by offering online courses; there are significant startup costs in personnel, mainly attributable to content development for online courses; in this study all the online courses were taught by full-time faculty, which ensured quality but increased cost; space is a cost-saving factor with some online courses. The paper notes that an important by-product of this process is information about the changing nature of faculty roles in online teaching and a better understanding of how to use technology cost effectively. (Contains 28 references.) (CH)

# Cost Analysis of Online Courses

2000 AIR Forum Paper

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ABSTRACT

Given the phenomenal growth and intense competition in online courses, how prepared are institutions for making the resource allocation decisions about virtual learning which confront them? This paper presents a complex, hybrid method based on the work of NACUBO, Jenny (1996), the Flashlight Cost Analysis Handbook, Bacsich (1999), and KPMG for conducting a cost analysis of online courses. The method incorporates data on expenditures; student and course enrollment; departmental consumption and contribution; space utilization and opportunity costs; direct non-personnel costs; computing support; faculty and staff workload; administrative overhead at the department, dean, and institution level; revenue stream; and financial aid. The results of this Mellon Foundation-funded study of online versus traditional section costs of courses at a public, doctoral I university are presented.

# Cost Analysis of Online Courses

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## Introduction

As institutions witness the phenomenal growth of virtual universities, cybercolleges, distance learning programs, and online courses, how prepared are they for making the decisions about resources which confront them? Some of the questions that need to be raised are:

*How much does it cost to develop an online course and what is the "break-even" point in enrollment?*

*When does a distance learning program become cost-effective and how should this be measured?*

*How much effort and funding should be put into online course development based on the mission and size of the institution?*

*Does it take less or more faculty time to run an online course?*

*Does it make sense to pool resources across departments or divisions to build online content?*

*Should the institution build strategic alliances with business and industry to meet online learning needs? If so, what expectations should institutions have about shared costs and revenue?*

*Even if online courses cost more, how much is it worth for the institution to be seen as a leader in the use of technology?*

These are some of the many questions and ideas which may be addressed if institutions build resource allocation models and a planning process for developing online content. The topic of online courses is not the only pressing question which suggests the need for a cohesive planning process and better resource allocation models. It is, though, perhaps the most costly to ignore; not only in terms of cost-effectiveness in using resources, but more importantly in taking advantage of the small window of opportunity which is now available for institutions to develop an online presence. There is fierce and aggressive competition from all sectors in the online marketplace for higher education.

Without the types of cost analysis described in this paper, colleges and universities are ill-prepared to meet this challenge and may find themselves left out of the race to capture the large but still finite market of online enrollment. Tony Bates states this more directly: "If we don't understand and measure the costs, how can we make informed decisions?" (Bacsich et al, 1999, p. 3).

This paper uses data from a comparison of online versus traditional course section costs at an urban, public Doctoral I university. The research was funded in part from a grant from the Andrew W. Mellon Foundation to this institution.

Literature Review

While there is a growing literature on how to build web-based courses, develop online degree programs, and incorporate best practices in instructional design, there is much less written about assessment and the success of these courses in meeting student and academic needs. Even less is written about the resource allocation issues which are involved, such as faculty workload, comparing costs between traditional and online courses, and computing support.

*The Flashlight Model*

One resource which is available for planners is the Flashlight Cost Analysis Handbook (Ehrmann and Milam, 1999), published by the Teaching, Learning, and Technology (TLT) Group, an affiliate of the American Association for Higher Education. This is the most recent in a series of online and print tools in the Flashlight Program, begun in 1993 as part of the Annenberg/CPB Projects to "help educational programs understand and shape the consequences of their own uses of computing, video, and telecommunications."

The Flashlight Program includes: (1) the Current Student Inventory (CSI), a 500 question/item bank and tool kit for survey development about the use of technology in teaching; (2) the new and evolving Faculty Inventory, of which Part I helps users compare faculty and student perceptions about the use of instructional technology; (3) Flashlight Online, a web-based tool for managing the CSI; (4) the Flashlight "Tool Series," involving subscription-based access to new tools and updates; (5) the Flashlight Network, for working with institutions and organizations in a wide range of activities such as Roundtables; (6) a monthly email newsletter, F-LIGHT; and (7) the Cost Analysis Handbook with its economic model.

In addition to a detailed discussion with examples of how to build cost analysis models, the Handbook provides advice about many of the organizational constraints which emerge when attempting this kind of resource allocation process. These include team development in model building, shared perceptions of project outcomes, and focusing on the unique cost drivers in a particular institutional setting. Aimed at all types of uses of technology in teaching, the Handbook is not focused primarily to online courses, but is easily adapted for this purpose.

*Standard Cost Literature*

This type of inquiry is well served by an understanding of the more general costing literature in higher education. The National Center for Higher Education Management Systems (NCHEMS) cost of instruction model has been in place for almost thirty years. It is perhaps most useful today, when institutional research offices have the tools to build online data marts and data warehouses which merge financial, student, and course datasets. At the heart of the NCHEMS model is the induced course load matrix (ICLM), first championed by Suslow (1976). The ICLM focuses on departmental consumption and contribution ratios of student credit hours (SCH), full-time equivalent students (FTE), and headcount enrollment. This tool is equally valuable in modeling the enrollment of traditional versus online courses. The NCHEMS model is still used by some state higher education executive offices (SHEEOs) to calculate discipline-specific staffing ratios, based on student credit hour productivity, and to model complex resource allocation issues.

Similarly, the literature of the National Association of College and University Business Officers (NACUBO) for indirect cost recovery and micro- and macro-costing is invaluable to this effort. This includes Cost Accounting in Higher Education: Simplified Macro- and Micro-Costing Techniques (Jenny, 1996); A Cost Accounting Handbook for Colleges and Universities (Hyatt, 1983); and Meisinger's (1994) College and University Budgeting: An Introduction for Faculty and Academic Administrators. Another

useful monograph, prepared by KPMG with a consortium of institutions and organizations in Great Britain, is Management Information for Decision-Making: Costing Guidelines for Higher Education Institutions (Joint Funding Councils, 1997).

*The Costs of Networked Learning*

The research study on the "Costs of Networked Learning" conducted by Paul Bacsich and others offers another important set of guidelines and models for approaching online course costs. They conclude that "The good news is that we believe that the problem can be analyzed not by educators inventing a new vocabulary for finance and planning (as some have effectively tried to do over the years), not by their denying the need for such tools (as others have often tried), but by using the tools that are (slowly) being used in universities to solve more general and management problems (Bacsich et al, 1999, p. iii).

Various sectors or types of institutions in Great Britain were surveyed for the Costs of Networked Learning project and the study's conclusions are important to consider at the outset of this paper. First, no one really knows how much networked learning (the online course) costs. A primary reason for this is that there is little literature in this area. Bacsich et al describe these citations as "confinable, with a slow rate of accretion. The sources are diverse, with only a small proportion of direct relevance and high quality" (1999, p. 75).

Second, the topic of costing online courses is very nebulous. Ash and Bacsich liken the cost inquiry to "weighing air," a phrase which "describes the process of quantifying something that quite definitely exists but is normally invisible and can only be measured by using special tools" (Ash and Bacsich, 1999, p. 2).

More importantly, institutions are not prepared to do the type of activity-based costing models which are necessary to understand these costs. While there is agreement that the taxonomy developed by the Joint Funding Councils and KPMG (1997) for breaking out costs is useful, many people believe that the costs of costing are too great (Bacsich et al, 1999). The KPMG model essentially parallels that proposed by Flashlight, including the need for data about staff costs, depreciation, other operating expenses, and overhead. Overhead includes building, equipment, premises (space usage), general administration, research administration, student services, and learning services.

Another fear of institutions that is raised by Bacsich (1999) and Moonen (1997) is that if costs were known, the results would be perceived as too expensive and would in effect inhibit innovation. The issue of the "costs of costing" is also raised, where it is perceived that an inordinate amount of effort is required to produce complex models, thereby eliminating any cost savings which might have resulted from what is learned with modeling.

*Building Models*

While models may be built without attention to this prior work in cost analysis, they will fail to address some of the complexities of enrollment, space utilization, overhead, and faculty/staff workload. This does not mean that only complex models should be built, but that any model development needs to be done with a clear set of assumptions. If assumptions about revenue, for example, will be ignored because student tuition estimates and financial aid data are not available or are too complex to be analyzed within the timeframe and staffing level, this needs to be recognized as a limitation of the model.

Most important to take from the cost literature are the concepts of: (1) enrollment data and departmental consumption/contribution; (2) space utilization and allocation costs; (3) revenue stream based on tuition and fees minus waivers and tuition discounting; (4) faculty workload; and (5) administrative overhead at the department, college/school, and institution-wide levels.

Methodology

A modified version of the Flashlight cost analysis methodology serves as the basis for this study. The first edition of the Handbook includes four case studies, each with unique resource allocation questions and individual versions of the model. However, the purpose and basic steps are the same.

The primary focus of the Flashlight methodology is on activity based-costing (ABC). ABC is a way of looking at costs that cross the traditional building blocks of institutions, for which a specific account or set of accounts are inadequate to track expenditures and revenues. As used at institutions such as Indiana University and Indiana University-Purdue University Indianapolis, ABC is part of a larger approach called Responsibility-Centered Management (RCM). Units at all levels, from departments to colleges, are held accountable for the cost of activities for which they are responsible, even if these activities cross the boundaries of departments, accounts, and majors.

An interesting and insightful example of implementing ABC is presented by Baxendale and Dornbusch (2000) in their article about financial planning for hospices. While the total cost of care for patients is the same in traditional and ABC methods, the ABC view allows planners to examine where the organization is spending a larger than expected proportion of its expenses. The results of the performance measure of cost per patient day is much different if it is broken out based on the type of patient (slow decline to death). The cost per patient day increases significantly as the patient approaches death. For online courses, the reverse may be true as costs decrease when they move from vaporware to courseware.

ABC is different from traditional accounting, which looks at expenditures and revenues within one or more account structures, based on organizational reporting relationships inherent in the financial chart of accounts. The type of cost analysis conducted by sponsored research and fiscal affairs offices is indirect cost recovery. Administrative overhead costs are shared across research activities based on a negotiated indirect cost rate, which is based on federally-mandated, complex weighting and allocation schemes.

Since sponsored research and service activities use institutional facilities, consume utilities, and require administrative oversight with functions such as human resources administration, it is important to consider these costs for sharing. In order to calculate "hidden" versus direct costs, micro-costing models have been developed. Where the Flashlight model incorporates only minimal calculations of hidden costs, some implementations such as that done by the author at the study institution are more complex in the use of administrative cost-sharing. This discussion of the costs of online courses will involve some relatively simple calculations of indirect costs, though the data are still difficult to gather. The reader is again referred to Jenny (1996) and the NACUBO literature for a more full discussion of micro-costing.

The Flashlight economic model involves seven basic steps. As stated in the Handbook, these are to:

1. Identify your resource concerns and the specific questions you want answered
2. Identify your outputs
3. Identify the activities that are required to produce your outputs
4. Identify the academic and support units that participate in these activities
5. Identify the resources these units consume in their activities
6. Calculate costs for these activities
7. Tally the costs of all activities to arrive at your output costs
   (Ehrmann and Milam, 1999, p. 11)

For the purposes of this discussion of online courses, three new steps are inserted. The step "identify the resources" is broken into two – for direct and indirect costs. The step for "calculate costs for these activi-

ties' is also broken into two, with additional data about enrollment via the induced course load matrix. A new step is added to calculate revenue stream based on enrollment, tuition and fees, and financial aid data. The revised steps of a cost model for analyzing online courses now include the following:

1. Define the resource issues
2. Choose outputs and performance measures
3. Document activities and tasks
4. Gather faculty and staff workload data
5. Collect data on direct costs
6. Calculate data on hidden, indirect, or shared administrative costs
7. Gather data on enrollment
8. Calculate results for each activity
9. Calculate revenue stream
10. Summarize the results

Steps for a Cost Analysis of Online Courses

**1. Define the resource issues**

Central to any model development is the need to define the objective. While this paper is focused specifically on examining cost issues for online courses, there are dozens of complex and informative issues which could be studied. It is impossible to create a single model which will meet a wide variety of needs. Planners are well served by establishing the resource allocation issue first, then building a model. Once a model has been developed and used for a specific question, new questions will arise. One needs to go through the model building exercise again, rather than look for ways to simply tweak the existing product. While this may seem a luxury of time, it prevents a type of planning myopia which sees only the solution, sometimes without truly documenting and challenging the assumptions behind it.

The Flashlight Cost Analysis Handbook recommends stating the resource allocation question directly in a few sentences. For example, that an institution wants to know whether it is cheaper to offer an online section of a course than its traditional counterpart. Cheaper will be defined for the time being as requiring less net costs per section.

In examining online courses, many questions beg comparison to their traditional counterparts and this process needs to be built into model development from the beginning. However, an online course may not have an on-campus equivalent. It may be necessary to benchmark against certain activities which make up the course, such as course preparation time.

In choosing an ABC resource issue to study, it is necessary to pick something which lends itself to being broken down by activities and within these tasks. If an institution outsources online course development to a vendor, it may be difficult to benchmark the costs by activity. A single fee per enrolled student may be paid per semester to the vendor. While the vendor supports the web server setup, course development, and administrative tasks, these are not broken out into data for an institution. Only the activities which are under institutional control may be more easily evaluated.

Whatever the question, planners need to ensure that building a model will benefit the institution by answering resource allocation questions of interest. The Flashlight Handbook suggests that a mock version of a model be created with simulated results. Does the report tell administrators what they need to know to make decisions? If not, it is better to reframe the scope of the model at the outset, rather than have to redefine it after much time and ownership have already gone into its development.

For the purposes of this paper, the resource question will involve comparing the net costs of online versus traditional delivery of the same course and subject matter. The following table documents the framework for comparison of online and traditional classes

*Table 1: Comparison of Online vs. Traditional Course Sections*

| Semester | Instructor | Type | Section |
|---|---|---|---|
| Fall 99 | John | Online | ENGL300A |
| Fall 99 | Jane | Classroom | ENGL300B |
| | | | |
| Fall 99 | David | Online | MIS 200A |
| Fall 99 | Sam | Classroom | MIS 200B |
| | | | |
| Spring 99 | Mary | Online | DESC 200A |
| Spring 99 | Louise | Classroom | DESC 200B |
| | | | |
| Spring 99 | Iris | Online | ASTR100A |
| Spring 99 | Peter | Classroom | ASTR100B |

**2. Choose outputs and performance measures**

After defining the resource question of interest, the next step is to decide how to measure costs. What does it mean that a traditional class is cheaper? Is this based on the overall cost of offering an online course per enrolled student? Per student credit hour? Are costs calculated per semester or over time? This is an important point, since it often takes several years to develop the final content and technology for an online course. Should the results somehow be amortized to reflect true costs and benefits?

Lessons learned from the four Flashlight case studies described in the Handbook suggest that one of the standard performance indicators, student credit hours, is inadequate for measuring costs in the use of technology in teaching. This is because many implementations of a technology are used for less than the traditional fifteen week course. It is this very flexibility in course scheduling, with differentiated stop and start dates and the ability to tailor course objectives to the audience, which makes online courses so appealing. The calculation of credit hours in a fifteen week semester is a traditional mindset which may or may not meet the needs of the resource allocation question of interest.

An alternative presented in the Handbook is weekly student course hours, the number of hours in which students are expected to be engaged in directed, course-related learning activities (which are different from time spent on homework assignments). For the traditional course which meets three hours per week for fifteen weeks, this equates to forty-five hours per student. Comparable to the measure of weekly student contact hour which is used for calculating space utilization, this measure is more helpful in examining usage statistics which do not fit the traditional, fifteen-week course type.

For models of online course costs which incorporate an assessment component as well, planners may wish to use performance indicators such as cost per passing student or cost per retained student. An online course may potentially meet the need of many more students. How many of these students remained enrolled after the tenth class day? Is there a higher drop-out or withdrawal rate than the tradi-

tional class section? Is there a lower pass rate or grade distribution? It is impossible to expect that this analysis of course costs will be done in a vacuum which does not take into account assessment issues which will eventually be raised. While this is not the intent of the model, performance indicators should be chosen which address the range of questions of interest.

Since it takes significant time to bring a concept for an online course to fruition, measuring course costs over a single semester may be misleading. Similarly, while it is interesting to examine expenditures, this singular focus fails to take into account the revenue side of the equation. Complex models may be built which incorporate revenue data based on student enrollment, calculated from tuition and fee charges by residency and student level and incorporating financial aid and internal tuition discounting. The performance measure of revenue per online course is misleading if part of the revenue is made up of internal funding with tuition discounting or if the data are hidden because of third party contracts with vendors.

For the purposes of this discussion, two performance indicators are chosen to compare an online and traditional version of the same course: total net cost per course section and total net cost per course credit hour. The definition of course credit hours involves multiplying the number of students enrolled at the semester census date by the number of credits awarded for completion of the course. The reliance on net costs requires data about student course-taking patterns, residency status, and tuition and fees charges in order to calculate revenue stream.

***Table 2: Format for Analysis of Performance Measures***

| Semester | Type | Section | Net Cost per Section | Net Cost per Course Credit Hour |
|---|---|---|---|---|
| Fall 99 | Online | ENGL300A | $ | $ |
| Fall 99 | Classroom | ENGL300B | $ | $ |
| | | | | |
| Fall 99 | Online | MIS 200A | $ | $ |
| Fall 99 | Classroom | MIS 200B | $ | $ |
| | | | | |
| Spring 99 | Online | DESC 200A | $ | $ |
| Spring 99 | Classroom | DESC 200B | $ | $ |
| | | | | |
| Spring 99 | Online | ASTR100A | $ | $ |
| Spring 99 | Classroom | ASTR100B | $ | $ |

### 3. Document activities and tasks

As the central feature of activity-based cost models, the documentation of activities and tasks for offering an online course is critical to a model's success. This requires a certain assessment-type approach which examines the nature of the teaching process and breaks the faculty role into parts. A traditional class may involve activities such as preparation, teaching, and administration. While these may be easily translated into specific tasks, such as creating the syllabus or grading exams, it is this definition of work and its equivalent expression in costs which are central to any ACB model.

In determining the activities and tasks involved in offering an online course, the faculty and staff involved are the best source of data. It is helpful to ask what seem on the surface to be simple, open-ended, and

innocuous questions. What do you do in this course? How do you handle the same types of tasks that you do in a traditional class?

Working to gather data on the many tasks which make up faculty work, one quickly learns that there is little written documentation of effort. Neither faculty nor staff routinely keep any type of logs of their activities. During an interview, they will think of the many tasks they performed to offer a course. Such reflection may be very haphazard and problematic for modeling. Faculty members may introduce technology into their classes over time, adding listservs, email, and HTML documents gradually into their classes over several years. A specific course may have evolved to the point where so much Internet-based technology is used that it makes sense to move it entirely online, but this is not necessarily a linear, sequential process. In understanding the development and impact of online course development at an institution, one should not be fooled into simplistic models of organizational theory, faculty development, or curriculum design.

Here, as part of model development, there is an invaluable by-product of this process – documentation of instructional roles. These will probably fall into the lifecycle of course development, with activities related to planning and development, production and delivery, and maintenance and evaluation (Bacsich and Ash, 1999). If planners are able to document the many tasks and range of activities which make up the faculty role, they will find that this list is interesting and useful in itself, even without data behind it. What exactly is the faculty role? How has the faculty role changed with offering online courses? These are not simple questions. Institutions such as the University of Phoenix rely solely on part-time faculty and there is no attempt to perpetuate the traditional faculty role. Should schools create an instructional development function to share and pool resources for online content development?

The model developed in this paper does not include ABC; not because it is not useful, but because of the inherent problems in the nature of data collection about faculty work. This issue is examined in depth in the next section. Other implementations of the Flashlight methodology are useful for understanding the ABC model. Given the specific use of the methods at the institution being studied, this feature was simply not practical without extensive faculty effort and record keeping.

Recognizing that online courses are developed over time, an amortization schedule will be used to share development costs across multiple offerings of the course. Each course amortization schedule is unique, based on the number of times the class will be offered and the degree to which the developed technology continues to change and require additional input/costs.

**4. Gather faculty and staff workload data**

While it may seem difficult to define the activities and tasks which go into developing and offering an online course, it is the gathering of actual workload data which is the most frustrating for planners. This is not to say that some institutions do not have faculty workload surveys in place or that department chairs do not have some degree of control over their faculty members' time. It is possible to be very precise about the amount of time faculty spend on different activities, but the results represent only a pattern of what may be taking place and will vary considerable between faculty, courses, activities, and semesters.

The issue was highlighted for the author when he attempted to ask online faculty about their percent of effort for instruction and toward the specific section. Responses provided by faculty at the end of the semester the course was offered were different than responses obtained only a few months later. Should an average of the two estimates be taken? For the purposes of this model, the most recent response is used, but with the recognition that it represents merely a possible pattern in the data and nothing that may be generalizable.

As part of a model, planners may wish to ask faculty to complete a workload survey which documents the time they spend on various activities. This process of reflection may be as beneficial for them as it is for your model. See Rockwell et al (1999) for a discussion of incentives and obstacles to that influence faculty in distance education teaching, particularly that it is "time demanding." Bacsich discusses the need for "managing the introduction of academic timesheets, however lightweight and non-threatening" (1999, p. 5).

One recommendation from a case study in the Flashlight Handbook is that institutions rely on a set of assumptions to estimate workload data. For some research and doctoral institutions, faculty are expected to teach at least two courses a semester, spend 25% of their time in departmentally-sponsored research (more if they have external funding and release time from teaching), and spend another 10% or so in administrative duties such as advising and attending faculty meetings. This suggests that only 65% of their time and salary is devoted to instruction-related activities. If faculty teach two courses per semester or four per year, then this 65% must be distributed among each of the four courses.

The National Survey of Postsecondary Faculty (NSOPF), conducted by the National Center for Education Statistics (NCES) provides a source for national benchmarks in faculty workload data (Kirshstein et al, 1997). The NSOPF documents a standard format for collecting complex workload data, asking faculty to estimate both the number of hours per week and the percent of time devoted to teaching, research and scholarship, professional growth, administration, outside consulting, and service/non-teaching. This is useful for benchmarking an institution's or individual's faculty workload against stratified averages by region, institutional control, and Carnegie classification.

Another alternative to this data collection problem is to simply ask each faculty member to estimate the proportion of their instructional time devoted to each course they teach. Without data from logs, this is simply an estimate. Note, this estimate is better informed if faculty are provided with a list of typical course activities to remind them of how many different roles they must juggle in the course of an academic year.

Whether it is with actual logs, estimates, or assumptions, faculty workload data are essential for any model of online course costs. Similarly, there are many staff support roles and graduate teaching assistant roles which need to be included. For example, if a department secretary is involved in collecting grades and distributing grade reports for a traditional course, how is this handled for an online course? Is there decreased cost because grades are posted online and given directly to the registrar? If these types of differences in administration and support are not somehow taken into account, the calculation of online versus traditional course costs will be misleading.

The following table documents faculty estimates about the percent of their time which goes for instruction-related activities and the percent of this instructional time which is devoted to the specific course. For several of the faculty who are part-time, this will be 100% in each column as they have no other assigned duties under the teaching contract. They may teach other classes, but these are usually covered under separate contracts.

*Table 3: Faculty Workload for Instruction and Section*

| Semester | Instructor | Type | Section | Percent for Instruction | % of Instruction for Section |
|---|---|---|---|---|---|
| Fall 99 | John | Online | ENGL300A | 50% | 30% |
| Fall 99 | Jane | Classroom | ENGL300B | 100% | 100% |
| | | | | | |
| Fall 99 | David | Online | MIS 200A | 50% | 50% |
| Fall 99 | Same | Classroom | MIS 200B | 100% | 100% |
| | | | | | |
| Spring 99 | Mary | Online | DESC 200A | 50% | 25% |
| Spring 99 | Louise | Classroom | DESC 200B | 40% | 50% |
| | | | | | |
| Spring 99 | Iris | Online | ASTR100A | 65% | 30% |
| Spring 99 | Peter | Classroom | ASTR100B | 50% | 50% |

## 5. Collect data on direct costs

*Personnel Expenditures*

Direct costs such as faculty compensation, including salary and benefits, are relatively easy to obtain from the institutional research, budget, and human resource office. However, it is important to verify these data with the faculty involved. This is especially true for part-time faculty who may teach several classes, each paid with a different funding record on different dates. Human resource data for these faculty will vary by date and funding record, depending on the extract date of the census file used for analysis.

*Table 4: Direct Faculty Compensation & Benefits per Section*

| Section | Salary | Benefits Rate | Total Compensation | Comp. Per Semester | % for Instr. | Comp. for Instruction | % for Section | Comp. Per Section |
|---|---|---|---|---|---|---|---|---|
| ENGL300A | $61,435.00 | 23.50% | $75,872.23 | $37,936.11 | 50.0% | $18,968.06 | 30.0% | $5,690.42 |
| ENGL300B | $2,400.00 | 0.00% | $2,400.00 | $2,400.00 | 100.0% | $2,400.00 | 100.0% | $2,400.00 |
| | | | | | | | | |
| MIS 200A | $102,962.00 | 23.5% | $127,158.07 | $63,579.04 | 50.0% | $31,789.52 | 50.0% | $15,894.76 |
| MIS 200B | $5,310.00 | 7.65% | $5,716.22 | $5,716.22 | 100.0% | $5,716.22 | 100.0% | $5,716.22 |
| | | | | | | | | |
| DESC 200A | $84,084.00 | 23.50% | $103,843.74 | $51,921.87 | 50.0% | $25,960.94 | 25.0% | $6,490.23 |
| DESC 200B | $72,300.00 | 23.50% | $89,290.50 | $44,645.25 | 40.0% | $17,858.10 | 50.0% | $8,929.05 |
| | | | | | | | | |
| ASTR 100A | $60,400.00 | 23.50% | $74,594.00 | $37,297.00 | 65.0% | $24,243.05 | 30.0% | $7,272.92 |
| ASTR 100B | $73,200.00 | 23.50% | $90,402.00 | $45,201.00 | 50.0% | $22,600.50 | 50.0% | $11,300.25 |

It is important to include other, non-faculty personnel who may be peripherally involved in offering the course. Examples include computing support staff who set up a special web server for the course or student wage employees who develop applications such as Java simulation exercises or ColdFusion templates administering online quizzes.

Data on these costs were gathered with estimates from the faculty interviews conducted at the university being studied. The university's Data Warehouse contains human resource data by different census dates. Since some of these expenses contributed to the course over time, they are amortized. These estimates are based on the assumption that the each online course will be offered at least 6 times over the course of approximately six semesters. The ENGL300A online course is expected to be offered up to 12 times in its evolving form over the next six semesters, as a number of faculty are involved in its development.

***Table 5: Other Direct Personnel Costs for Online Sections***

| Section | Personnel | Time | Rate of Pay | Cost |
|---|---|---|---|---|
| ENGL300A | Course Instructor | Additional funding for course development | 7K Amortized over 12 semester sections | $583.34 |
| ENGL300A | MIS faculty | 10 hours | 60K + Benefits = $74.100 /2080 hours - $35.62 per hour/ Amortized as above | $29.69 |
| ENGL300A | Research assistant | Spring 1999 | $2.000 Amortized as above | $166.67 |
| ENGL300A | Course consultant | Spring 1999 | $3.000 Amortized as above | $250.00 |
| ENGL300A | Course consultant | Spring 1999 | $2.000 Amortized as above | $166.67 |
| ENGL300A | Assessment developer | Spring 1999 | $2.000 Amortized as above | $166.67 |
| ENGL300A | Total | | Total | $1,976.05 |
| | | | | |
| MIS 200A | Course Instructor | Additional funding for course development | $23.000 Amortized over 6 semesters | $3,833.33 |
| MIS 200A | Eric | 50 hours in semester | $13 per hour | $650.00 |
| MIS 200A | Eric | 20 hours per week in summer/10 weeks=200 | $13 per hour. Amortized over 6 semesters | $433.00 |
| MIS 200A | Jeff | 10 hours | $13 per hour. Amortized | $22.00 |
| MIS 200A | Jenny | 10 hours | $13 per hour. Amortized | $22.00 |
| MIS 200A | Eric's brother | One-time | $50 one-time | $50.00 |
| MIS 200A | Total | | Total | $5,010.33 |
| | | | | |
| DESC 200A | Course Instructor | Additional funding for course development | $8,000 Amortized over 6 semesters | $1,333.33 |
| DESC 200A | TA for Spring 97 | 20 hours per week * 15 weeks = 300 hours | $10 per hour. Amortized | $500.00 |
| DESC 200A | TA in Summer for Java | N/A | $3.000. Amortized | $500.00 |
| DESC 200A | Total | | Total | $2,333.33 |
| | | | | |
| ASTR 100A | Course Instructor | Additional funding for course development | $15.000 Amortized over 6 semesters | $2,500.00 |
| ASTR 100A | Total | | Total | $2,500.00 |

*Non-Personnel, Direct Expenditures*

In exploring non-personnel, direct expenditures, the data are less useful: not because they cannot be broken down by transaction for individual expenditures, but because there are so few direct purchases made for a specific course. In one of the case studies described in the Flashlight Handbook, faculty reported

bearing the cost of many small items themselves. It is important to ask faculty about these hidden costs and include them if possible.

Monthly departmental account reports are a starting point in this discussion. These server to remind faculty of the different types of expenditures which they may have for a course. Most financial reports for departments are broken down by account and within this into object codes, clusters of expenditures such as travel or printing that are grouped together for budget and resource allocation purposes.

A traditional class may involve $100 worth of copying, but this is not included in any meaningful way in an existing report. An individual faculty may have a code used by the copy center and may estimate that copies made on a certain date were probably for a class. More likely these data are reported back by the copy center by account code, not by individual user, and provide no insight into costs. This reality of reporting suggests that planners should put data collection instruments about expenses in place ahead of time.

A breakout of non-personnel expenditures is documented in the following table. These are amortized over time where appropriate. For two of the online courses, there are no expenditures. The traditional course counterparts also have no special expenditures.

*Table 6: Direct Non-Personnel, Non-Computing Costs for Online Sections*

| Section | Expenditure Type | Total Cost | Amortization | Section Cost |
|---|---|---|---|---|
| ENGL300A | Books | $200 | Over 6 semesters | $33.33 |
| ENGL300A | Conference Travel | $3,000 | Over 6 semesters | $500.00 |
| ENGL300A | Total | | Total | $550.00 |
| | | | | |
| MIS 200A | Overheads | $10 | N/A | $10.00 |
| MIS 200A | Cassette Tapes | $1 per tape X 80; 20% lost per semester | $80 over 6 semesters; $20 extra per semester | $33.33 |
| MIS 200A | Audio Duplication | $1 per tape X 80; 20% lost per semester | $80 over 6 semesters; $20 extra per semester | $33.33 |
| MIS 200A | Total | | Total | $76.66 |
| | | | | |
| DESC 200A | N/A | N/A | Total | $0.00 |
| | | | | |
| ASTR 100A | N/A | N/A | Total | $0.00 |

**6. Calculate data on hidden, indirect, or shared administrative costs**

In its report Straight Talk about College Costs & Prices, the Congressionally-sponsored National Commission on the Cost of Higher Education discusses the "veil of obscurity" which hangs over financial data (Harvey et al., 1998). This is perhaps no more true than in regard to administrative overhead.

*Departmental Overhead*

Direct expenditures only describe part of the story of what it takes to offer a class. Offering an online course in department X may not cost the same as if it were offered in department Y, solely because of departmental overhead. Student course enrollment is the only factor to be considered. All instruction-related costs must somehow be taken into account.

For example, department X may offer 50 different course sections in a semester, and department Y 40. The department X and Y staff each include a department chair and a secretary/technician. Neither staff may spend any time directly related to the online course, but they support the activity in an indirect way by monitoring, oversight, personnel matters, etc. Somehow these costs need to be distributed across all types of instructional activity, a particularly difficult task for independent studies, private instruction, and advising roles. This may be done with various allocation schemes, such as by student credit hour or by individual course. Since the overhead of monitoring the success of enrollment is often at the course level, online course costing models may want to allocate departmental costs by the course section. Note: this is adequate if there are not too many cross-listed sections which appear on the surface to be different classes, but actually are all meeting at the same time, day, and place.

Department X's chair and staff compensation costs are allocated therefore to each of the department's 50 courses, department Y's to its 40 courses. If the chair and staff salaries are relatively equal, department X will end up costing less per section in administrative overhead because it has more classes, even though it may not have more enrollment. Some planners may choose to allocate department overhead by other means.

Similar allocation schemes need to be built at the dean's or division level and at the institutional level. These data suggest that not all departments and schools are equally prepared to bear the cost of an online course. It may be much more economical in terms of overhead to offer an online course in English, where there are many courses and a relatively thin departmental support team, than to offer courses in Anthropology, where there may be far fewer courses. A minimum infrastructure is necessary, regardless of the size of a department, and there is an economy of scale factor at work.

The addition of an online section of an existing course should not be considered cost-free in terms of departmental overhead merely because the staff are already employed. Rather, all classes require departmental effort and the online section simply lowers the gross cost per section for all classes.

The circumstances for departmental overhead vary with different disciplinary structures at institutions. Regardless, these support costs are real and need to be included in resource allocation models. While allocation schemes may be criticized for their lack of precision, planners must adopt some type of allocation method in order to proceed. They must admit, however, that the results are not generalizable and are only one possible pattern of costs and not the "real" or "true" cost of anything.

For the purposes of this study, data were obtained for each department and division in which course sections were offered, including English (ENGL), Management Information Systems (MIS), Decision Sciences (DESC), and Astronomy (ASTR). For ENGL, there is a clear cost center in the department of English. Examining the account structure for MIS and DESC, the data show that only faculty salary and fringe benefits are pooled at the department level. It is therefore necessary to make calculations about these courses based on expenses and activity at the deans'/division level. ASTR is an interesting case, for the faculty teaching the online course is in another smaller division which does not have separate department account structures. Cost analysis of the course must include a traditional version of the course, which in this case is offered in the department of Physics/Astronomy. This requires that departmental and division overhead charges be calculated for this comparison section.

Administrative overhead costs at the department level need to be calculated only for English and Physics/Astronomy. Division level overhead costs need to be calculated for the School of Management (SOM) where MIS and DESC are housed, the Institute for Computational Science and Informatics (ICSI) where the online astronomy faculty is located, and the College of Arts and Sciences (CAS) where the ENGL and Physics and Astronomy departments are housed. In each case, it is necessary to obtain finan-

cial expenditure data at the object code level within any and all instructional accounts related to each cost center. Also, since the ASTR and DESC sections were offered in Spring, 1999, overhead must be calculated for the 1998-99 academic year. The MIS and ENGL sections require overhead data for 1999-00.

These data on expenditures by object code within each account structure were obtained from the university's Data Warehouse. Due to the nature of documenting expenditures over time, budget data were used in place of actual expenditures. However, the budget figures were updated over the course of the fiscal year and, according to the Budget Director, serve as an adequate estimate of instructional costs per account.

In examining departmental overhead, it is necessary to delete expenses related to other full-time and part-time faculty and graduate assistants. This is because the focus is only on prorating costs which may reasonably be associated with overhead for a course section. These other faculty monies should be tied directly to the sections for which the personnel are involved. Only the overhead functions of administrators and classified/non-faculty staff should be included. Since fringe benefits costs are lumped together in one series of object codes at this university, it is necessary to calculate fringe costs separately. Per the Budget Director, these are estimated as 23.5% fringe for administrators and non-faculty staff and 7.65% for wage employees. There is no fringe benefit calculation for part-time, temporary, college work study, and student wage employees.

Other than personnel services (OTPS) expenditures are subtotaled separately. All types of instruction-related, non-personnel expenses such as copying and telephones which may not be directly tied to a specific course should be including in the estimate. If direct expenditures are included for the course and these were paid from the same account as the department or division account, then these should be subtracted from the total so as not to be counted twice.

After deleting faculty data and estimating fringe costs, the data on expenditures by object code appear as follows for the English Department at the university being studied.

***Table 7: Partial Expenditures by Object Code for English Department***

| Object Code | Description | Budget |
|---|---|---|
| 1310 | CLASSIFIED SALARY | 109,838 |
| | Fringe for classified | 25,812 |
| 1400 | BUDGET POOL-WAGES&OT | 68,989 |
| 1420 | WAGES-STUDENTS | 6,111 |
| 1610 | STUDENT WAGES CWS | 5,000 |
| 2000 | BUDGET POOL-OTPS | 24,004 |
| 3110 | EXPRESS SERVICES | 186 |
| 3140 | METERED MAIL | 3,241 |
| 3144 | BULK MAIL | 20 |
| 3148 | OTHER MAIL | 271 |
| 3150 | PRINTING SERVICES | 14 |
| 3160 | TELECOMM SVS DIT | 29,100 |
| 3170 | TELECOM SVS NONSTATE | 7,245 |
| 3177 | LONG DISTANCE TELE | 2,063 |

These expenditures by object code are then aggregated or rolled up to sub-groups and totaled for each department. For the Physics/Astronomy and English departments, the data appear as follows:

*Table 8: Expenditures by Sub-Group by Department*

| Departmental Budget | 1998-99 PHYS/ASTR | 1999-00 ENGL |
|---|---|---|
| Classified Staff | 54,418 | 105,200 |
| Wages | 8,296 | 0 |
| Student Wages | 7,446 | 6,111 |
| College Work Study | 7,500 | 5,000 |
| Fringe - Classified/Admin Fac | 12,788 | 24,722 |
| Fringe - Wages | 635 | 0 |
| OTPS | 55,983 | 121,136 |
| Total Expenditures | 147,066 | 262,169 |

As stated earlier, there are many ways to allocate overhead costs. A unique allocation scheme is necessary for the purposes of the online versus traditional course comparison. Usually, this calculation is done using student or course credit hours or major headcount. Credit hours are chosen for some models of departmental activity because headcount implies costs related to advising majors. Since decision-making, enrollment planning, content management, and staffing all take place at the level of the individual course section, this is the methodology chosen for this particular example

To allocate or prorate departmental expenditures per course section, it is necessary to know how many sections were offered during the academic year. This must include both Fall and Spring semesters. Summer enrollment, faculty contracts, and twelve-month administrative staffing in departments and deans' offices are unique issues not dealt with here, though they are important for analysis of online courses offered or developed during the summer months. Since all of the courses being studied were offered in either Spring 1999 or Fall 1999, the number of course sections is calculated accordingly.

Data on course section offerings are collected by the institutional research office of the university for mandated state reporting and internal analyses. An existing series of enrollment reports capture these data at the division level, listing the number of sections by type offered by each division. Using the Data Warehouse, these data were obtained for the four semesters of Fall 1999, Spring 1999, Fall 1999, and Spring 2000 in order to estimate costs per section for the 1998-99 and 1999-2000 academic years. Special runs of the same report were required for the data at the department level.

The data on departmental sections for English appear in the following table.

*Table 9: Total 1999-2000 Section Data for the English Department*

| English | Fall 1999 | Spring 2000 | Total |
|---|---|---|---|
| Lecture/Seminar Sections | 265 | 270 | 535 |
| Lab/Rct Sections | 1 | 1 | 2 |
| Total | 266 | 271 | 537 |

These data may then be used in conjunction with the expenditure data to calculate estimated departmental overhead costs per course section.

*Table 10: Expenditures per Course Section for the English Department*

| Department Budget | ENGL 1999-00 |
|---|---|
| Total Expenditures | $262,169 |
| Total number of sections | 537 |
| Dept overhead per section | $488.00 |

*Deans'/division-Level Overhead*

Only those accounts which are directly related to administrative operations should be included in this second set of calculations for dean/division-level overhead. These were identified by using financial reports from the university's Data Warehouse and verified by the university's Budget Office. Again, only object codes for non-personnel (OTPS) expenditures, classified/non-faculty staff, and administrators are included. Other expenses for full-time and part-time faculty and graduate assistants are excluded because they do not contribute to the administrative overhead necessary to offer the courses. It is necessary to combine data by object code across accounts and then estimate fringe benefits with the same method described above for departments.

*Table 11: Administrative Overhead Accounts within a Division*

| Account | Name |
|---|---|
| 111274 | IT&E LAB SUPPORT |
| 111275 | IT&E PT / GTA |
| 111997 | RESERVE DEAN IT&E |
| 146010 | DEAN IT&E |
| 146011 | IT&E CONTRACT COURSE SHARE |
| 154075 | IT&E GRAD ADMISSIONS |

*Table 12: Expenditures by Sub-Group by Division*

| Expenditure | ICSI | SOM | SOM | ITE | CAS | CAS |
|---|---|---|---|---|---|---|
| Division Budgets | 1998-99 | 1998-99 | 1999-00 | 1998-99 | 1998-99 | 1999-00 |
| Administrative Faculty | 0 | 436,310 | 822,675 | 571,567 | 672,837 | 812,900 |
| Classified Staff | 197,161 | 670,434 | 771,647 | 187,171 | 399,099 | 410,386 |
| Wages | 0 | 11,438 | 17,144 | 61,531 | 25,022 | 19,102 |
| Student Wages | 0 | 41,552 | 20,409 | 69,269 | 4,995 | 8,092 |
| College Work Study | 7,500 | 15,000 | 12,000 | 6,000 | 3,600 | 3,000 |
| Fringe - Classified/Admin Fac | 46,333 | 260,085 | 374,666 | 178,303 | 251,905 | 287,472 |
| Fringe – Wages | 0 | 875 | 1,312 | 4,707 | 1,914 | 1,461 |
| OTPS | 124,798 | 410,895 | 836,714 | 389,199 | 249,630 | 389,046 |
| Total Expenditures | 375,792 | 1,846,589 | 2,856,566 | 1,467,748 | 1,609,002 | 1,931,460 |

The method for allocating resources by divisions is no longer the course section. Since services increase with increased student course load, the division and institutional overhead allocations are made by course credit hour. These data are obtained from the Glimpse of Course Enrollment which is produced each semester by the university's office of institutional research. Division data for one semester appear in the following table.

*Table 13: Fall 1999 Course Sections by Division*

| Academic Division | Course Level | Lec/Sem Sections | Lab/Rct Sections | Credit Hours | Total FTE |
|---|---|---|---|---|---|
| CAS | Undergrad | 1,039 | 296 | 118584 | 7905.6 |
| CAS | Graduate | 220 | 15 | 10559 | 879.9 |
| CAS | Total | 1,259 | 311 | 129143 | 8785.5 |
| ICSI | Graduate | 25 | 0 | 659 | 54.9 |
| ICSI | Total | 25 | 0 | 659 | 54.9 |
| ITE | Undergrad | 93 | 88 | 12975 | 865 |
| ITE | Graduate | 106 | 0 | 7737 | 644.7 |
| ITE | Total | 199 | 88 | 20712 | 1509.8 |
| SOM | Undergrad | 153 | 2 | 25055 | 1670.3 |
| SOM | Graduate | 41 | 0 | 2572.5 | 214.4 |
| SOM | Total | 194 | 2 | 27627.5 | 1884.7 |

The data must be aggregated across semesters to obtain total course credit hours generated in the academic year, broken out by division. With these results, division overhead costs per section and per course credit hour may then be calculated as follows.

*Table 14: Overhead Cost Calculations by Division*

| | 1998-99 ICSI | 1998-99 SOM | 1999-00 SOM | 1998-99 ITE | 1998-99 CAS | 1999-00 CAS |
|---|---|---|---|---|---|---|
| Total Expenditures | 375,792 | 1,846,589 | 2,856,566 | 1,467,748 | 1,609,002 | 1,931,460 |
| Total Sections | 45 | 409 | 419 | 570 | 2,991 | 3,124 |
| Division Overhead per Section | 8,351 | 4,515 | 6,818 | 2,575 | 538 | 618 |
| Course Credit Hours (Academic Year) | 1,091 | 54,938 | 56,329 | 40,108 | 242,144 | 248,685 |
| Division Overhead per Course Credit Hour | $344.45 | $33.61 | $50.71 | $36.59 | $6.64 | $7.77 |

There is wide variation in overhead costs per course credit hour. The ICSI division, which produces far fewer sections, is much more expensive. It is interesting to note that deans'/division-level overhead is an important cost driver. The following table uses the calculated cost per course credit hour by division and applies it to the four pairs of comparison sections.

*Table 15: Division Overhead Costs per Online Section*

| Overhead Calculations | Online | Classroom | Online | Classroom | Online | Classroom | Online | Classroom |
|---|---|---|---|---|---|---|---|---|
| Class Section | ENGL300A | ENGL300B | MIS200A | MIS200B | DESC200A | DESC200B | ASTR100A | ASTR100B |
| Headcount Enrollment | 13 | 22 | 76 | 81 | 85 | 62 | 48 | 306 |
| Course Credit Hours | 39 | 66 | 228 | 243 | 255 | 186 | 144 | 918 |
| Division overhead per course credit hour | 7.77 | 7.77 | 50.71 | 50.71 | 33.61 | 33.61 | 344.45 | 6.64 |
| Division overhead for online section | 302.90 | 512.60 | 11,562.38 | 12,323.06 | 8,571.12 | 6,251.88 | 49,600.39 | 6,099.94 |

*Institutional Overhead*

To calculate overhead at the institution level, it is necessary to separate out all academic divisions which generate courses from purely administrative or operational units such as student affairs, computing, and libraries. Using the Data Warehouse, financial data on budgets for expenditures were obtained for the two years during which course sections met, 1998-99 and 1999-00. The list of divisions and expenditures appears as follows. After the data on budget by division are totaled and the course credit hours offered over the two semesters of each academic year totaled, the cost per course credit hour may be calculated.

*Table 16: Institutional Overhead Budgets by Division*

| Division | 1998-99 Budget | 1999-00 Budget |
|---|---|---|
| Balance Appropriation | 3,982,301.00 | 4,328,178.00 |
| Multi-Campus | 783,712.00 | 773,026.00 |
| Budget & Planning | 1,008,812.00 | 1,019,749.00 |
| Campus Life | 543,068.00 | 681,530.00 |
| Instr. Improvement & Technology | 2,910,801.00 | 3,277,183.00 |
| Enrollment Services | 3,640,611.00 | 3,807,455.00 |
| Senior Vice President | 1,469,411.00 | 1,188,887.00 |
| Fiscal Services | 3,239,573.00 | 3,412,583.00 |
| Human Resources | 1,553,217.00 | 1,658,936.00 |
| Instructional Support | 2,581,769.00 | 2,479,951.00 |
| Information Technology & Support | 382,133.00 | 1,597,316.00 |
| Library | 8,992,581.00 | 9,612,538.00 |
| Operations | 2,648,634.00 | 3,278,338.00 |
| Plant/Facilities | 12,878,921.00 | 13,707,845.00 |
| Executive Affairs | 1,559,141.00 | 1,708,639.00 |
| Academic Administration | 4,088,030.00 | 4,636,672.00 |
| Property Rental | 1,095,000.00 | 2,080,000.00 |
| Student Development | 2,048,111.00 | 2,343,562.00 |
| Safety Operations | | 566,382.00 |
| University Life | 1,239,911.00 | 1,323,725.00 |
| University Development | 1,108,453.00 | 1,221,669.00 |
| University Computing & Info Systems | 9,857,663.00 | 11,197,084.00 |
| University Relations | 2,632,316.00 | 2,642,767.00 |

Using the total budget per year in institutional overhead, it is then possible to calculate the cost per course credit hour. For this performance measure, the number of course credit hours in all divisions is totaled for both semesters in each academic year. The results appear in the following table.

*Table 17: Institutional Overhead Calculations per Course Credit Hour*

| Division | 1998-99 Budget | 1999-00 Budget |
|---|---|---|
| Total expenditures | $70,300,697.00 | $78,601,221.00 |
| Academic Year Course Credit Hours | 444,779.00 | 451,152.00 |
| Cost per course credit hour | $158.06 | $174.22 |

After the cost per course credit hour is calculated, it is then possible to obtain the institutional overhead costs for each section.

*Table 18: Institutional Overhead Costs per Section*

| Overhead Calculations | Online | Classroom | Online | Classroom | Online | Classroom | Online | Classroom |
|---|---|---|---|---|---|---|---|---|
| Class Section | ENGL300A | ENGL300B | MIS200A | MIS200B | DESC200A | DESC200B | ASTR100A | ASTR100B |
| Headcount Enrollment | 13 | 22 | 76 | 81 | 85 | 62 | 48 | 306 |
| Course Credit Hours | 39 | 66 | 228 | 243 | 255 | 186 | 144 | 918 |
| Institutional overhead per course credit hr | 174.22 | 174.22 | 174.22 | 174.22 | 158.06 | 158.06 | 158.06 | 158.06 |
| Institutional overhead | 6,794.71 | 11,498.74 | 39,722.93 | 42,336.28 | 40,304.69 | 29,398.71 | 22,760.29 | 145,096.87 |

*Space Costs*

Much attention is given in the popular press to potential cost savings which may result because online courses do not require bricks and mortar buildings. While it is true that classroom space is not required as much as for the traditional class, this space is not the only component of facilities room use, simply the most recognizable. Faculty office, instructional support, clerical support, and computing facilities also need to be included in the use of space by the online course.

In determining the cost of using space on campus, there are many models. Based on the work of Gordon Winston, the National Cost Commission report suggests including opportunity costs in the examination of tuition price and subsidy. One possible way to express opportunity costs is as the lost revenue which could have been earned if an institution had rented the same space at fair market value. This calculation also builds in depreciation and maintenance, other facility costs not usually taken into account in models. Regardless of whether an online course uses classroom space, models need to make assumptions about hidden facilities costs. Many traditional courses will have the same or greater costs, so the difference may be negligible. However, no course costing model is complete which does not include some assumptions about space utilization. If anything, it is important to use these data to show that online courses provide substantive savings based on their decreased use of space, a claim that while intuitively true needs data to support it.

The first step for this part of the model is to obtain an extract file from the institution which contains course meeting data for the semester in which the section met. Using data on the stop and start dates for which the class was offered, the days of the week the class met, and the beginning and end meeting times,

it is possible to calculate the amount of time each class met per day, week, and semester. This total time per class per semester is then calculated as a percentage of the total time in which a room was utilized for instruction to prorate space costs. A portion of a course meeting file for the university is displayed in the following table.

*Table 19: Course Meeting File for Classroom Utilization Statistics*

| Term | Disc | CNUM | Sect | Start | Stop | Days | BLDG | Room | Begin | End | Class Time | Weekly Time | Total Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99F | PHYS | 122 | 1 | 8/30/39 | 9/29/39 | T R | ENT | 275 | 9:00 | 10:15 | 1:15 | 2:30 | 10:42 |
| 99F | PHYS | 123 | 1 | 10/4/39 | 11/3/39 | T R | ENT | 275 | 9:00 | 10:15 | 1:15 | 2:30 | 10:42 |
| 99F | LRNG | 602 | 1 | 9/9/39 | 10/14/39 | F | ENT | 275 | 18:00 | 21:30 | 3:30 | 3:30 | 17:30 |
| 99F | LRNG | 602 | 1 | 9/17/39 | 10/22/39 | S | ENT | 275 | 9:00 | 16:30 | 7:30 | 7:30 | 37:30 |
| 99F | PUAD | 660 | 2 | 8/26/39 | 10/7/39 | F | ARL | 257 | 18:00 | 21:00 | 3:00 | 3:00 | 18:00 |
| 99F | PUAD | 661 | 1 | 10/21/39 | 12/9/39 | F | ARL | 257 | 18:00 | 21:00 | 3:00 | 3:00 | 21:00 |
| 99F | PUAD | 660 | 2 | 8/20/39 | 10/8/39 | S | ARL | 257 | 9:15 | 17:15 | 8:00 | 8:00 | 56:00 |
| 99F | PUAD | 661 | 1 | 10/15/39 | 12/10/39 | S | ARL | 257 | 9:15 | 17:15 | 8:00 | 8:00 | 64:00 |

For the purposes of this study, the local commercial, space rental rate of $25 per square foot per year is used, prorated over the course of three semesters to $8.33 per square foot per semester.

*Table 20: Space Costs per Course Section*

| Section | Room | Sq Feet | Cost per SF for semester | Total cost | Hrs used | Total use | %Use | Space cost |
|---|---|---|---|---|---|---|---|---|
| ENGL300A | Online | 0 | 8.33 | $0.00 | 0:00 | 0:00 | 0.0% | $0.00 |
| ENGL300B | Robinson B222 | 484 | 8.33 | $4,031.72 | 40:00 | 981:20 | 4.1% | $164.34 |
| | | | | | | | | |
| MIS 200A | Online/FAB B108 | 1,050 | 8.33 | $8,746.50 | 6:00 | 502:40 | 1.2% | $104.40 |
| MIS 200B | AQ 102 | 1,392 | 8.33 | $11,595.36 | 40:00 | 613:20 | 6.5% | $756.22 |
| | | | | | | | | |
| DESC 200A | Online/AQ 102 | 1,392 | 8.33 | $11,595.36 | 12:00 | 632:25 | 1.9% | $220.02 |
| DESC 200B | ST 131 | 1,794 | 8.33 | $14,944.02 | 43:25 | 732:51 | 5.9% | $885.34 |
| | | | | | | | | |
| ASTR 100A | Online | 0 | 8.33 | $0.00 | 6:00 | 0:00 | 0.0% | $0.00 |
| ASTR 100B | LH 1 | 2,556 | 8.33 | $21,291.48 | 40:42 | 374:34 | 10.9% | $2,313.51 |

Note that two of the online courses, ENGL300A and ASTR100A, did not meet at all on campus. The other two online courses met two and four times respectively on campus, usually at the beginning and end of the semester, for orientation and for exams.

In addition to these classroom costs, it is important to estimate the amount of other space used by the faculty and course. In conducting interviews or surveys with faculty about the course, information should also be collected about other space they used. Where it is difficult to obtain these data, the same estimates used for percent of instruction devoted to instruction and to the individual course section may also

be applied to percent of use for faculty office space. The following table illustrates the calculation of this non-classroom space.

*Table 21: Non-Classroom Space Costs per Course Section*

| Section | Room | Type | % Use | Space Amt | Calculation | Cost |
|---|---|---|---|---|---|---|
| ENGL300A | Rob A421 | Office | 5.0% | 107 SF | 5% X (121 SF X $8.33 per SF) | $50.40 |
| ENGL300B | Part-time | None | n/a | n/a | n/a | n/a |
| | | | | | | |
| MIS 200A | ENT 146 | Office | 30.0% | 121 SF | 30% X (121 SF X $8.33 per SF) | $302.38 |
| MIS 200A | ICASIT Center | Office | n/a | 1 of 3 rooms | 1 room in Center (1/3 X 1200) = $400 per mo X 10% | $40.00 |
| MIS 200A | Total | | | | Total | $342.38 |
| MIS200B | Part-time | None | n/a | n/a | n/a | n/a |
| | | | | | | |
| DESC200A | ENT 152 | Office | 20.0% | 128 SF | 20% X (121 SF X $8.33 per SF) | $213.25 |
| DESC200B | ENT 144 | Office | 20.0% | 140 SF | 20% X (121 SF X $8.33 per SF) | $233.24 |
| | | | | | | |
| ASTR100A | ST1 109 | Office | 20.0% | 118 SF | 20% X (121 SF X $8.33 per SF) | $196.59 |
| ASTR100B | ST1 213 | Office | 20.0% | 141 SF | 20% X (121 SF X $8.33 per SF) | $234.91 |

*Computing Support Costs*

Computing support costs should also be included in complex models of online course costs. The use of computing equipment, telecommunications, and software for a specific course is relatively easy to collect, in contrast to the availability of data on hidden costs such as the use of local area networks and Internet access. It is in these hidden computing costs that the planner may find the greatest dearth of data and lack of a meaningful allocation scheme. An online course uses a listserv. During a given semester, there may be 150 listservs in operation. What is the course's share of this cost? Should it simply be 1/150$^{th}$ of the cost for the semester, or should it be based on some measure of activity in the listserv such as number of postings?

A series of other equipment questions follow: What server is used to house the listserv? What did the server cost to purchase or upgrade and what does it cost to maintain in terms of utilities and staffing? What activities does the server support and how might these be prorated to allocate the server costs? What space costs should be included?

Each technology used in online courses should be scrutinized in this manner. This includes email, listservs, newsgroups, telnet, FTP, threaded discussion rooms, chat rooms, MUDs and MOOs, administrative information systems, web servers, Java simulations, Flash graphics, collaboration software, audio/video delivery, and application server or middleware products such as Perl, PHP, ColdFusion, and Active Server Pages.

In many cases. planners will find that there are no existing studies which document the costs of any of these services. They are all open for learning about costs through activity-based costing. Faced with this problem. rather than build incomplete models or models that rely on estimates that are little supported with data. planners should recognize that a model adds value beyond its immediate results by helping to document these hidden support costs.

Of course. if faculty set up their own web servers. or if the course is the first time that the particular technology has been used at an institution. the costs are more readily identified. A single course section should not bear these costs alone. Amortization schemes are needed which spread these costs over time. It is important to pay attention to the evolution of technology in a department's courses and the ways in which this lends itself to other online content development. Resource allocation models need to incorporate this development process.

Direct computing costs to be included in the model are the computer. printers. and network used by the faculty. staff. graduate assistant. and perhaps even the students in the course. Some estimates may come from data about faculty workload. as was suggested in the calculation of faculty office space usage. For example. 65% of a faculty member's activities may be instruction-related. therefore 65% of the personal computer cost is instruction related. Of this 65%. the faculty member may teach four courses per academic year. If evenly distributed. 16.25% of the amortized semester's cost for purchasing the PC and 16.25% of direct software and other computing costs may be allocated to each of the four course sections.

Another method for estimating direct computing costs is to interview each person involved in the course about the equipment and software and the percent of time used for the specific section. This second method was adopted for the comparison of online courses in this paper.

***Table 22: Direct Computing Costs per Section***

| Section | Type | Total Cost | Amortization | Cost per Section |
|---|---|---|---|---|
| ENGL300A | Cable modem | $50 per mo | None. 50% for class | 100.00 |
| ENGL300A | Telephone line | $20 per mo | None. 50% for class | 40.00 |
| ENGL300A | Computer | 2,500.00 | Six semesters. 25% for class | 104.17 |
| ENGL300A | Scanning software | 100.00 | Six semesters. 25% for class | 4.17 |
| ENGL300A | Total | | Total | 248.33 |
| ENGL300B | None | 0.00 | None | 0.00 |
| | | | | |
| MIS 200A | Internet Service | $50 per mo | None. 5% for class | 10.00 |
| IS 200A | Compaq Computer | 1,500.00 | Six semesters. 25% for class | 62.50 |
| MIS 200A | Home Computer | 2,400.00 | Six semesters. 25% for class | 100.00 |
| MIS 200A | Total | | Total | 172.50 |
| MIS200B | None | 0.00 | None | 0.00 |
| | | | | |
| DESC200A | Computer | 2,000.00 | Six semesters. 50% for class | 83.33 |
| DESC200B | Computer | 2,000.00 | Six semesters. 50% for class | 83.33 |
| | | | | |
| ASTR100A | Computer | 2,000.00 | Six semesters. 50% for class | 83.33 |
| ASTR100B | Computer | 2,000.00 | Six semesters. 50% for class | 83.33 |

Data on indirect computing costs such as Internet access and threaded discussion groups are also needed for the course sections. These data are very hard to collect and the allocation schemes necessary for pro-rating usage across courses or transactions are rudimentary at best. For the purposes of the model described in this paper, these indirect computing costs will be assumed to be included in the institutional overhead calculation for computing which is allocated per course credit hour.

**7. Gather data on enrollment**

In understanding costs, many performance indicators are built around enrollment. These include weekly student contact hours, the number of passing students, student credit hours, course credit hours, headcount enrollment, full-time equivalent students, and other calculations. Much is learned by knowing class enrollments, but this is only a starting point. If revenue is to be considered, more complex analyses such as those contained in the induced course load matrix or ICLM are needed.

The structure of most administrative information systems used by higher education institutions typically includes in the course database table one record per student per course per semester. Therefore, if a student takes five three credit hour classes, whether or not they meet online or on campus, there will be five records created in the student database. Since one of these is for a specific course, it may be estimated that 20% of the revenue generated by a single student's tuition and fees for the semester should be counted for the course.

This simple example is repeated many thousands of times to estimate what proportion of all students' course activity goes to the single online course being studied. If there are 100 students enrolled in the three credit online course, and they all take five courses each, then the course section serves the equivalent of 20 full-time equivalent (FTE) undergraduate students (300/15). This is based on the standard 15 credit hour load used by most researchers to translate credit hours into FTE.

If the average full-time tuition and fees charge for a semester is $2,000, and if none of these students receives any financial aid, it may be reasonably estimated that the course earned $40,000 in revenue. See the section of revenue stream for an example of what these data look like when they are collected.

Course data have many more benefits for modeling than this type of calculation, though. Most useful is the measurement of departmental consumption and contribution in the ICLM. A department offers classes that are taken by many different students, not just its own majors. When non-majors take its courses, the department is contributing to other departments. When performance measures are based solely on majors, the department suffers since it has a service role that is not being taken into account. Similarly, a department's majors take many courses outside of the department, making it a consumer of other departments' offerings. This balance of consumption and contribution in course activity is the basis for academic resource allocation. Bacsich and Ash expect deans and department chairs to welcome the development of cost models, so that they "may empower them to negotiate better with service departments over overhead" (1999, p. 6).

In estimating the cost of online courses, it is interesting to examine whether they contribute to a department's role in consumption or contribution. If a department continues to serve more outside students, this should be part of resource allocation decisions. Such an argument may help a department get funding for an additional faculty position. The flip side of this perceived service and consumer role is faculty workload. With online courses, it is theoretically possible to serve more students with existing resources, changing the departmental dynamic. It is important to balance the competing tensions of service, consumption, faculty workload, and enrollment.

In the past, it has been very difficult to view the hundreds of thousands of cells and possible relationships between units. With web database applications such as data marts and data warehouses, planners and institutional researchers are able to illustrate these results in a way which is more readily understood and used by chairs and deans for resource allocation.

Only with this type of complex course data may planners measure departmental service to majors versus non-majors. This is important for the study of online course costs because the choice of online course subject and level is not done without political implications. For example, it may be possible to develop an online course that serves numerous non-majors, using part-time faculty to teach the class once it has been developed by full-time faculty. This is the case for at least one of the online courses for the university being studied in this paper. If enrollment remains steady, the department will continue to meet the need of non-majors for the course, but possibly at a much lower cost as it is turned over to part-time faculty. This will free up full-time faculty to teach graduate courses to majors (for which they may feel more rewarded).

The following table of information about headcount and course credit hour enrollment is necessary for calculating the two performance measures. The columns of data on majors versus non-major headcount are simulated to suggest how the issue of departmental service and consumption may be viewed. Note that the second section of ASTR100 serves many non-majors. If the online course attracted this number of students, it is possible that the Astronomy faculty would be freed up to work more closely in other courses with majors.

***Table 23: Enrollment per Section***

| Section | Headcount | Course Credit Hours | Service to Majors | Service to Non-Majors |
|---|---|---|---|---|
| ENGL300A | 13 | 39 | 5 | 8 |
| ENGL300B | 22 | 66 | 12 | 10 |
| | | | | |
| MIS200A | 76 | 228 | 50 | 26 |
| MIS200B | 81 | 243 | 63 | 18 |
| | | | | |
| DESC200A | 85 | 255 | 45 | 40 |
| DESC200B | 62 | 186 | 57 | 5 |
| | | | | |
| ASTR100A | 48 | 144 | 24 | 24 |
| ASTR100B | 306 | 918 | 16 | 290 |

**8. Calculate results for each activity**

Following the steps of the model, data are gathered first on the types of activities and tasks involved in offering an online course, then about faculty and staff workload. These are then prorated against compensation (salaries and benefits). Any direct costs associated with the online course are documented, even those born out of pocket by the faculty member. If at all possible, administrative overhead for at least the department level should be estimated. Dean's level and institutional administrative cost sharing may be calculated for instruction-related expenditures. Indirect, overhead costs are allocated at the department

level by the number of course sections and at the division and institutional level by the number of course credit hours.

The resulting subtotals of expenditures for course sections are used to calculate the performance indicators of interest. Though not collected in this study, these costs may be broken out by ABC activity if available, such as course preparation, teaching, and administrative tasks. For example, an online course may involve many more hours in course preparation than a traditional course. In overall costs, the online course may be more expensive for this reason, because it consumes more compensation. The next time the course is offered, however, this activity is not nearly as labor intensive, driving the cost of course preparation down and making the online course as cost-effective as its traditional counterpart. With increased enrollment, it may be more cost-effective.

Some of the other cost drivers which may be built into the model include: (1) faculty compensation – for example if part-time faculty are used to teach the course; (2) using a vendor to handle the online technology; (3) offering the course in a department where there is less administrative overhead; and (4) using less classroom and/or office space.

While it may appear at first that an online course is equally if not more expensive to offer, what other cost drivers might effect the result? If another, less expensive full-time faculty member taught the same course, would the cost go down or would it go up because this person had to spend more time in instructional-related activities? If a part-time faculty member taught the course, would there be additional overhead required to monitor class participation, moderate online discussion, and keep the content matter current? Does it truly cost less if a class never meets on campus or is it less expensive to meet several times on campus because this builds a relationship between the instructor and the students and improves student retention and grades? These are only a few of the many questions which may be asked of models.

The following table lists each type of cost calculated in the model and provides the total expenditures per course section.

***Table 24: Total Expenditures per Section***

| Expenditure | ENGL300A | ENGL300B | MIS200A | MIS200B | DESC200A | DESC200B | ASTR100A | ASTR100B |
|---|---|---|---|---|---|---|---|---|
| Direct faculty salaries & benefits | 5,690.42 | 2,400.00 | 15,894.76 | 5,716.22 | 6,490.23 | 8,929.05 | 7,272.92 | 11,300.25 |
| Other personnel costs | 1,976.05 | 0.00 | 5,010.33 | 0.00 | 2,333.33 | 0.00 | 2,500.00 | 0.00 |
| Direct, non-personnel costs | 450.00 | 0.00 | 76.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Departmental overhead | 488.00 | 488.00 | n/a | n/a | n/a | n/a | n/a | 1,149.00 |
| Division overhead | 302.90 | 512.60 | 11,562.38 | 12,323.06 | 8,571.12 | 6,251.88 | 49,600.39 | 6,099.94 |
| Institutional overhead | 6,794.71 | 11,498.74 | 39,722.93 | 42,336.28 | 40,304.69 | 29,398.71 | 22,760.29 | 145,096.87 |
| Classroom space costs | 0.00 | 164.34 | 104.40 | 756.22 | 220.02 | 885.34 | 0.00 | 2,313.51 |
| Office space costs | 50.40 | 0.00 | 342.38 | 0.00 | 213.25 | 233.24 | 196.59 | 234.91 |
| Direct computing costs | 248.33 | 0.00 | 172.50 | 0.00 | 83.33 | 83.33 | 83.33 | 83.33 |
| | | | | | | | | |
| Total Expenditures | 16,000.81 | 15,063.68 | 72,886.33 | 61,131.78 | 58,215.96 | 45,781.55 | 82,413.52 | 166,277.81 |

**9. Calculate revenue stream**

*Tuition Revenue based on Enrollment*

In the following chart, a portion of an extract file is displayed and illustrate the calculation of tuition revenue based on credit hour load and residency status. This requires knowledge of the institution's tuition policy, particularly for out-of-state students who take the maximum number of hours permitted without paying additional tuition charges per credit.

***Table 25: Section Enrollment by Residency, Hours Taken for Revenue Stream***

| TERM | Section | Level | Residency | Total Hrs Taken | Total Tuition Charges | Percent of Hours for Section | Class Tuition |
|---|---|---|---|---|---|---|---|
| 99B | ASTR100 | FR | In-State | 3 | $454.50 | 100.00% | 454.50 |
| 99B | ASTR100 | FR | In-State | 12 | $2,172.00 | 25.00% | 543.00 |
| 99B | ASTR100 | FR | In-State | 12 | $2,172.00 | 25.00% | 543.00 |
| 99B | ASTR100 | FR | In-State | 12 | $2,172.00 | 25.00% | 543.00 |
| 99B | ASTR100 | FR | In-State | 13 | $2,172.00 | 23.08% | 501.23 |
| 99B | ASTR100 | FR | In-State | 18 | $2,353.00 | 16.67% | 392.17 |
| 99B | ASTR100 | FR | In-State | 11 | $1,991.00 | 27.27% | 543.00 |
| 99B | ASTR100 | FR | Out-of-State | 11 | $5,731.00 | 27.27% | 1563.00 |
| 99B | ASTR100 | FR | Out-of-State | 12 | $6,252.00 | 25.00% | 1563.00 |

*Financial Aid*

In calculating the amount of revenue generated by an online course's enrollment, the results need to be adjusted based on financial aid. Just as the institution's course file is used to document the total number of classes taken by students in the course, financial aid extracts are used for this part of the model (if available). However, these data files are complex and easy to misinterpret.

Financial aid data are used to offset the expected tuition and fees charge. This is the net of the tuition and fees charges after any internal tuition discounting or waiver which may be in place. For example, an employee may be enrolled in the course. While the person should be included in measures of faculty workload and expenditures, she or he may have a tuition waiver as a benefit of employment so that there is no associated revenue going to the institution.

For most purposes, it is adequate to estimate the percent of enrollment by course level with waivers and with tuition discounts. The average tuition discount per student level or course level may be calculated by the financial aid office, perhaps as part of routine reports for admissions guides or the institutional fact book. These discounts are often labeled as institutional scholarships or grants.

At least two national sources are available for free, online access to financial aid data at the institutional level – the annual U.S. News ranking of colleges and the National Center for Education Statistics (NCES) IPEDS COOL website (College Opportunities On-Line). IPEDS COOL includes data collected as part of the Institutional Postsecondary Financial Aid (IPSFA) study conducted in August, 1999. Data on the university studied in this paper are available in IPEDS COOL for the percent of first-time, full-time undergraduate students receiving different types of aid in 1998-99. The site also includes data on the average award for institutional grants (scholarships and fellowships).

*Revenue Stream Calculations*

From these raw course and tuition and fees data by student, it is possible to aggregate or group to the course section and calculate the total revenue stream.

***Table 26: Estimated Revenue Stream per Course Section***

| Section | In-State Tuition | Out-of-State Tuition | Total Class Tuition | In-State Enrolled | Out of State Enrolled | % In-State | Total Enrolled |
|---|---|---|---|---|---|---|---|
| ENGL300A | $5,593.31 | $0.00 | $5,593.31 | 13 | 0 | 100.0% | 13 |
| ENGL300B | $7,554.82 | $4.298.25 | $11,853.07 | 19 | 3 | 86.4% | 22 |
| | | | | | | | |
| MIS 200A | $28,030.32 | $9.321.39 | $37,351.71 | 69 | 7 | 90.8% | 76 |
| MIS 200B | $31,374.79 | $5.205.13 | $36,579.92 | 77 | 4 | 95.1% | 81 |
| | | | | | | | |
| DESC200A | $33,740.87 | $14.947.61 | $48.688.48 | 73 | 12 | 85.9% | 85 |
| DESC200B | $24.521.05 | $15.445.97 | $39,967.02 | 50 | 12 | 80.6% | 62 |
| | | | | | | | |
| ASTR 100A | $21,677.23 | $2.571.60 | $24,248.83 | 46 | 2 | 95.8% | 48 |
| ASTR 100B | $127,597.84 | $45.706.41 | $173,304.25 | 272 | 35 | 88.6% | 307 |

One cost driver for revenue is the number of out-of-state students in a class section. It is interesting to note that online enrollments often come from traditional campus students. Out-of-state students may be more likely to supplement traditional courses with online courses to get their tuition's worth, further complicating the study of online costs.

After the estimated, total tuition generated per section is calculated, this is adjusted based on financial aid. Financial aid in the form of federal grants, loans, work study, and private scholarships do not impact the revenue stream. Only institutional aid in the form of grants and scholarships, otherwise known as tuition discounting, takes money out of the revenue stream. Some label this kind of aid as "funny money." Regardless of institutional practice, revenue is decreased.

To calculate the effect of institutional aid, student enrollment data are analyzed based on the number of credit hours taken to document whether students are full- or part-time for purposes of qualifying for financial aid. The number of full-time students ias totaled for each course section. Data reported by institutions to the NCES for 1998-99 financial aid awards was used to get the percent of students receiving institutional aid at this institution (2%) and the average amount of aid they received ($3.561). This figure was applied to the full-time student number to estimate the number of students who would probably have received institutional aid. This financial aid per section is subtracted from the total tuition estimate obtained above to get an adjusted revenue stream. A table documenting these calculations is presented below.

*Table 27: Adjusted Revenue Stream based on Institutional Aid*

| Section | Total Class Tuition | Total Enrolled | Full-time | Institutional Aid (2%) | Amount of Aid (3.561 avg) | Adjusted Class Tuition |
|---|---|---|---|---|---|---|
| ENGL300A | $5,593.31 | 13 | 21 | 0 | 0 | $5,593.31 |
| ENGL300B | $11,853.07 | 22 | 8 | 0 | 0 | $11,853.07 |
| | | | | | | |
| MIS 200A | $37,351.71 | 76 | 74 | 1 | 3.561 | $33,790.71 |
| MIS 200B | $36,579.92 | 81 | 72 | 1 | 3.561 | $33,018.92 |
| | | | | | | |
| DESC200A | $48,688.48 | 85 | 80 | 2 | 7.122 | $41,566.48 |
| DESC200B | $39,967.02 | 62 | 55 | 1 | 3.561 | $36,406.02 |
| | | | | | | |
| ASTR 100A | $24,248.83 | 48 | 37 | 1 | 3.561 | $20,687.83 |
| ASTR 100B | $173,304.25 | 307 | 285 | 6 | 21.366 | $151,938.25 |

Two more potential cost drivers for the model are the percent of students receiving institutional grants and scholarships and the average award amount.

**10. Summarize the results**

This final step brings the expenditure and revenue components of the model together to calculate the overall cost of course sections using the performance measures. It is here, though, that planners often face a dilemma – how to interpret the results; for every performance indicator may be interpreted in several ways. A lower cost for the online course, perhaps due to the cost driver of high enrollment, may be seen as cost-effective use of technology. If the cost per section is deemed too low, the same result may be deemed by critics as inadequate academic support and a possible problem in academic integrity.

If ABC methodology is used, the model results may show that there is a high cost in terms of faculty compensation for the activity of course preparation. This will decrease significantly the next time the online course is offered because the faculty member will only have to update web content. Where is the displacement in effort going to take place. Will faculty members spend more time conducting departmental research? If they are already engaged in the allowable percentage of time for this activity, what is to stop them from spending more time on research, especially if there are no data available to track their effort? Perhaps the time originally spent on course preparation should be shifted to some other instructional activity to help increase students' retention rate or improve the average grade distribution.

The following table depicts the performance measure results of the completed study.

*Table 28: Performance Measure Results per Course Section*

| | Online ENGL300A | Classroom ENGL300B | Online MIS200A | Classroom MIS200B | Online DESC200A | Classroom DESC200B | Online ASTR100A | Classroom ASTR100B |
|---|---|---|---|---|---|---|---|---|
| Total Expenditures | $16.000.81 | $15,063.68 | $72.886.33 | $61.131.78 | $58.215.96 | $45,781.55 | $82.413.52 | $166,277.81 |
| Total Revenues | 5.593.31 | 11,853.07 | 33.790.71 | 33,018.92 | 41.566.48 | 36.406.02 | 20.687.83 | 151,938.25 |
| Net Cost per Section | 10.407.50 | 3.210.61 | 39.095.62 | 28.112.86 | 16.649.48 | 9.375.53 | 61.725.69 | 14,339.56 |
| Course Credit Hours | 39 | 66 | 228 | 243 | 255 | 186 | 144 | 918 |
| Cost per Course Credit Hour | 410.28 | 228.24 | 319.68 | 251.57 | 228.30 | 246.14 | 572.32 | 181.13 |
| Net Cost per Course Credit Hour | $266.86 | $48.65 | $171.47 | $115.69 | $65.29 | $50.41 | $428.65 | $15.62 |

*Discussion*

The results suggest. first of all. that this type of complex model may be completed with data available in many universities existing administrative information systems. The only component missing from this particular model is indirect computing support.

In terms of total expenditures. all of the pairs of sections are relatively in the same range except ASTR. which has high overhead per course credit hour but also high revenue.

Net costs per section are noticeably higher for online courses. This goes up to 3:1 for ENGL and 4:1 for ASTR. Total net costs per section will vary widely based on the institutional overhead cost. which increases with course credit hours. Net costs per course credit hour. which evenly distributes institutional overhead. varies widely. from $15.62 for a traditional section of astronomy to $428.65 for the online section of the same course. The MIS and DESC net costs are somewhat similar between the traditional and online sections. but the online version of the English course is five times the traditional. Why is there so much variation?

First. there is a benefit to offering online courses in departments and divisions which already generate extensive course sections. It is in the division overhead charges that the online astronomy section becomes expensive to offer. If the same section were offered within the department of Physics and Astronomy. housed in the College of Arts and Sciences. the costs would be much lower. even with the same faculty compensation expenditures. Perhaps it should have been costed within this department. but it was the more expensive division where it originated.

There are significant startup costs in personnel. Even though amortized over the course of six to twelve course offerings. the online course will bear this additional expenditure. Hopefully. content development is not an ongoing process. At some point in time. online content may begin to pay for itself. This would show up in the model as decreased faculty workload in teaching the section and decreased need for additional personnel costs.

All of the online courses are taught by full-time faculty. most of them tenured and at least one at the full professor level. This ensures the quality of the online offering. but increases costs. The traditional sections of ENGL and MIS are much more expensive if full-time faculty are used instead of part-time. This brings up the necessity of comparing apples to apples and oranges to oranges. Only the DESC pair of sections includes the same use of full-time faculty and the same overhead structure. ENGL and MIS have different types of faculty in the comparison sections. ASTR crosses divisions and departments in over-

head. In hindsight, costs should be modeled only for course sections which share the same attributes and differ only in their use of the Internet for delivery.

Space is a factor in cost-savings that is realized with the online courses, though less so when these sections still meet occasionally on campus. Again, there are comparison issues. The section with the highest space costs, ASTR100B, met in a room that had fewer classes meeting in it. This higher utilization rate translated into higher costs. Calculation of utilization rates, though time consuming and difficult to do, is possible with existing course meeting files obtainable from the registrar's or institutional research office. Winston's concept of opportunity cost is a reasonable method for estimating the true cost of classrooms and takes into account depreciation and maintenance.

*Tweaks of the Cost Drivers*

If it were possible to compare apples to apples in this model, then pairs of online and traditional sections would be chosen which have the same faculty compensation rate; faculty workload; departmental, division, and institutional overhead; headcount enrollment and course credit hours; and use of office space. The only difference would be in the use of other personnel and direct OTPS costs to develop the online course, the use of classroom space, and increased use of computing equipment and software.

While the traditional section has additional space costs, it does not have the development costs. Over time, as development costs for the online course decrease, it becomes proportionally less expensive than the traditional section.

A similar scenario may be created in which the effects are shown of increased online enrollment. With everything else being equal, the online section generates more revenue without additional space demands, where the traditional class is bound to available classroom scheduling and faculty workload constraints.

***Table 29: Online Costs with Enrollment Increases***

| | Online Semester 1 | Online Semester 2 | Online Semester 3 | Online Semester 4 |
|---|---|---|---|---|
| Total Expenditures | 51,250 | 51,250 | 51,250 | 51,250 |
| Total Revenues ($3,000 for 15 hrs) | 18,000 | 24,000 | 30,000 | 36,000 |
| Net Cost per Section | 33,250 | 27,250 | 21,250 | 15,250 |
| Course Credit Hours | 90 | 120 | 150 | 180 |
| Net Cost per Course Credit Hour | $369 | $227 | $142 | $85 |

Given that so many factors may not be equal in a particular costing model, planners need to construct worksheets that will allow them to tweak different cost drivers and build these types of scenarios.

Conclusions

It is perhaps in documenting and questioning assumptions rather than in actual performance measure results that models may best serve planners and institutional researchers. So often, they meet with difficulties in gathering data to build models. It is important to see where the value of modeling really lies. Some of the most important by-products of this process are information about the changing nature of fac-

ulty roles in online teaching and a better understanding of cost drivers and how these may be used to ensure cost-effective uses of technology.

There is much more to be said about this type of model building. This paper has involved a review of the literature and models for evaluating resource use in teaching with technology. Though sparse, new and existing work by NACUBO, the Mellon Foundation, the Joint Funding Councils in Great Britain, the Costs of Networked Learning project, and other organizations have much to offer. The Flashlight Cost Analysis Handbook methodology has been modified specifically to the topic of online courses and lends itself well to this purpose.

Clearly, one of the greatest hurdles for planners is in gathering the data they need about faculty workload, administrative cost sharing, and other hidden or indirect costs such as computing support. For the purposes of the study described in this paper, it was impossible to collect ABC data within the constraints of the project timeline and scope. Adequate assumptions about faculty workload for instruction and for the individual course section may be made, but the argument for better data is compelling.

This paper documents how existing data collected by a university may be used to build a model of online course costs. This is the result of a 15 month effort to locate existing data and request special institutional research reports. Many planners may be unaware that these data are available to them and it is hoped that these examples will spur them to seek the information they need. Except for the Flashlight Cost Analysis Handbook and the NACUBO literature (particularly Jenny, 1996), there are very few publications or conference papers which present complex examples of how to find, analyze, sort, group, aggregate, recode, and weight student, course, human resource, and financial data to build these models.

What is most critical to helping institutions prepare for cybercolleges and web-based courses is a vision of what is possible with resource planning models of this type. By following the basic steps of the Flashlight Handbook, the Joint Funding Councils/KPMG model, and this model, planners are better able to address the competing tensions and priorities of complex academic issues. Planners and institutional researchers alike do their institutions and themselves a disservice if they neglect to use the tools and data at hand to help make decisions about the future of online learning.

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